

TEMPERATURE CONTROLLER

Catalogue Number : TCS1T100 & TCS2T100



TCS1T100



TCS2T100

FEATURES

- Compact Size, Lower depth of 65mm
- Wide auxiliary supply voltage range 90 -270V AC/DC
- Configurable Output : 10A Relay or 12V, 50mA SSR drive
- Universal Input Capability: Thermocouple & PT100
- IP-65 Front panel Protection
- Sensor Break, Over Range & Under range detection
- Selectable Lower display only for TCS2T100
- LED indication for Relay output, Autotune
- Confirms to CE and EMC directive
- Ready programming code for easy programming.

CAUTION

- Installation should be done by skilled person only, avoid incorrect connections
- When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring
- For RTD sensor, use a wiring material with a small lead resistance (5Ω max per line) & no resistance differentials among 3 wires
- Product should be cleaned with a clean soft cloth & Do not use isopropyl alcohol or any other cleaning agent to avoid blockage of ventilating parts
- Use of contactors is recommended if load exceeds the contact rating Please see Inductive load category
- When replacing the sensor, please turn OFF the power

TECHNICAL SPECIFICATIONS

Supply Characteristics		
Rated Supply voltage (Un)	90V to 270V AC/DC	
Supply frequency	47/ 63 Hz	
Typical Power Consumption	6VA @240VAC	
Functional Characteristics		
Sensor Inputs (IEC)	Thermocouple (J, K, T, R & S) RTD (Pt-100, 3-wire, 2-wire) For 2 wire RTD short terminal number 9 & 10	
Sensor Measurement Range	J-type	°C -199 to 750 °F -199 to 999
	K-type	°C -199 to 999 °F -199 to 999
	T-type	°C -199 to 400 °F -199 to 752
	R & S-type	°C 0 to 999 °F 32 to 999
	RTD (PT-100)	°C -150 to 850 °F -199 to 999
Resolution	1°C Fixed	
Measurement Accuracy	TC: ±0.5% of PV or ±2°C (Higher one) ±1 digit. R & S: ±0.5% of PV or ±2°C (Higher one) ±1 digit. RTD: ±0.5% of PV or ±3°C (Higher one) ±1 digit.	
Signal Sampling Time	50 mS	
Key De-bouncing time	30 mS	
Error Indications	5_Er	Sensor open/Break error
	oUr	Over range error
	U_nr	Under range error
	E_Alt	Error in auto tune
	SSr	SSR short circuit detection

NOTE

- 20 Min Warm-up time for all Thermocouple sensor
- Accuracy ±10°C over the temperature range & under influence of electromagnetic environment .
- Product innovation being a continuous process, we reserve the right to alter specifications without any prior notice
- Ensure that the input sensor connected at the terminals and the input type set in the product configuration are the same.
- To allow the heat to escape, do not block the area around the product. Do not block the ventilation holes around the product.
- To avoid inductive noise, do not wire power lines together with or parallel along with sensor cables

Environmental Parameters

Operating Temperature	0 °C to 60 °C
Storage Temperature	-20 °C to 75 °C
Humidity	85% RH (Without condensation)
Altitude	2000 meters (Max)
Pollution Degree	2
Over voltage category	II

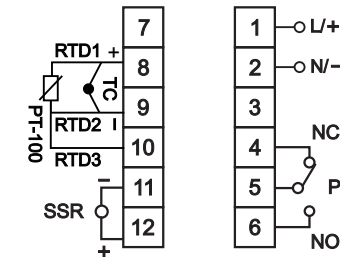
Mechanical Parameters

Degree of protection	Front fascia -IP 65 , Enclosure - IP 30 & Terminals- IP 20
Housing	UL94-00
Mounting	Panel Mounting
Dimensions (L X W X D)	48 x 48 x 65 in mm
Weight (Unpacked)	95 gm Approx.(TCS1T100 & TCS2T100)

Output Characteristics

Output	Relay/SSR
Contact arrangement	Relay 1 : 1 C/O (4,5,6)
Contact Material	AgNi
Contact rating	10A (Res.) @240VAC/28 VDC
Mechanical Life	1 × 10 ⁷ Operations
Electrical Life	1 × 10 ⁵ Operations
SSR O/P Voltage	12VDC, 50mA (Max)

CONNECTION DIAGRAM



Note: This connection diagram is applicable for TCS1T100 & TCS2T100

TERMINAL TORQUE AND CAPACITY

Tightening Torque	0.5 Nm(4.5 LB.in) Terminal Screw - M3
	1 x 2.5 mm ² Wire with Lug AWG: 1 X 22 to12

ELECTROMAGNETIC COMPATIBILITY

EMI/ EMC TEST

Harmonic Current Emissions	IEC 61000-3-2 Class A
Voltage Flicker and Fluctuations	IEC 61000-3-3 Class A
ESD	IEC 61000-4-2 Level 3
Radiated Susceptibility	IEC 61000-4-3 Level 3
Electrical Fast Transients	IEC 61000-4-4 Level 4
Surge	IEC 61000-4-5 Level 3
Conducted Susceptibility	IEC 61000-4-6 Level 3
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Voltage Dips & Interruptions (DC)	IEC 61000-4-29
Conducted Emission	CISPR 11 Class A
Radiated Emission	CISPR 11 Class A

SAFETY DATA

Dielectric strength (Input & Output)	IEC 60255-5 Level 2kV
Impulse Voltage between input and output	IEC 60255-5 Level 4kV
Insulation Resistance	UL 508, >100MΩ
Leakage Current	UL 508, <3.5mA
Single Fault test	IEC 61010-1

ENVIRONMENTAL DATA

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC60068-2-27
Non-repetitive Shock	IEC60068-2-27

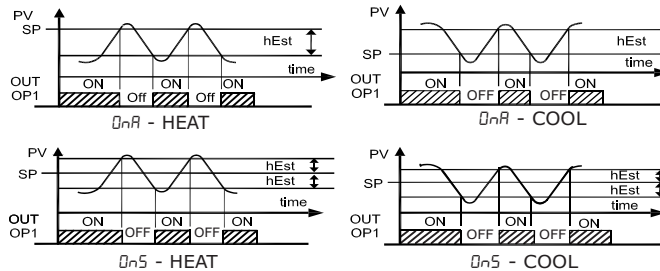
E-WASTE REGULATORY NOTICE



Kindly treat, recycle or dispose of this equipment in an environmentally sound manner after End of Life, as per WEEE (Waste Electrical and Electronic Equipment) regulations or as per local norms; or hand it over to General Industrial Controls Pvt. Ltd, through website <https://www.gicindia.com/get-in-touch/>

USER GUIDE

ON/OFF Control: Parameters regarding ON/OFF control are placed under DN (Down) in Input menu .This type of control can be set by programming parameter "con"= On5 for ON-OFF action with symmetric hysteresis OR OnR for ON-OFF action with asymmetric hysteresis. It drives the output programmed as COP ,depending on the measured temperature value, on set point, function mode (Fun) and on the hysteresis (HYS).In case of reverse action i.e. HEAT being set on par. "Fun" menu, the controller activates the output when the process value "PV" goes below [SP-HYS]. It deactivates the output when the PV goes above "SP+HYS" in case of symmetric ON-OFF control and above "SP" in case of Asymmetric ON-OFF control. Similarly in case of direct action i.e. COOL being set on par. "Fun", the controller activates the output when the process value "PV" goes above 'SP+HYS' & deactivates the output when "PV" goes below 'SP-HYS' in case of symmetric ON-OFF control & "SP" in case of Asymmetric ON-OFF control.



PID Control: Parameters regarding PID control are placed under DN (Down) key in Input menu .This type of control can be set by programming parameter "con"= PID. A PID controller depending upon the effective setpoint "SP", function "fun" and on the instrument's PID algorithm the control output is calculated. The PID control algorithm foresees the setting of following parameter:
Pb: Proportional band
Int: integral Time
Der: derivative Time
Ct : Cycle time

Auto tuning: Parameters regarding Auto tuning are placed under UP key in regulator (reg) menu. This Auto tuning can be set by programming parameter "TUN"= OFF for Auto tune action with Fun = "hEst" if using heater or "col" if using cooler. It drives the output programmed as cop [in STATUS], depending on the setting:
"TEP" - Tune at every Power ON.
"T1P" - Tune at first power ON.
"TMN" - Tune manually.
"TSP" - Tune at every set point change.

The condition needs to satisfy for to start Auto tune For Ag1 & Ag2:
If "Fun" is "hEst", : $PV < [SP - |SP/3|]$
If "Fun" is "col", : $PV > [SP + |SP/3|]$
If the PV condition is not satisfied at start of auto tune, display will shows "ERR" message and device works according to previous set program of PID.

Rate (rLE) & Offset (oFL): Product can be re-calibrated according to application needs, by using par. "oFL" and "rLE". If "rLE" = 1.00, then using par "oFL", it is possible to set positive or negative offset that is simply added to the value read by the probe. If the offset set is not to be constant for all measurements, it is possible to operate the calibration on any of two points. In this case, in order to decide which values to program on par. "oFL" and "rLE", the following formulae must be applied:

$$rLE = (y2 - y1) / (x2 - x1)$$

$$oFL = y2 - rate * x2$$

Where,

y1 = Measured temperature 1
x1 = temperature displayed by instrument
y2 = Measured temperature 2
x2 = temperature displayed by instrument.

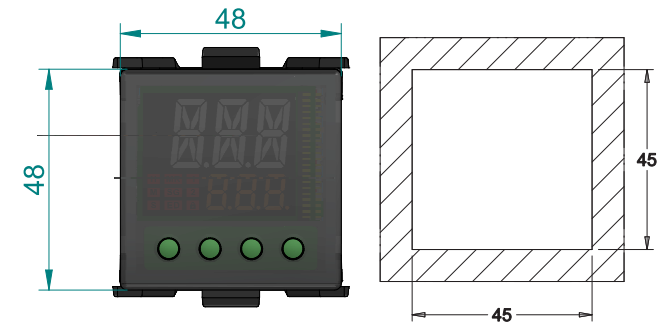
The instrument thus visualizes the temperature as:

$$y = x * rLE + oFL$$

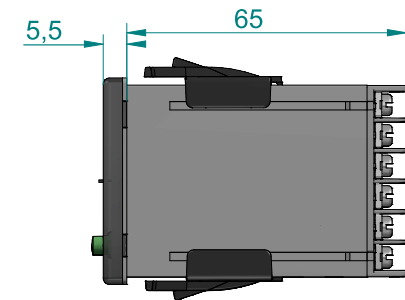
where y = displayed value and x = measured value.

Offset is placed under DN (Down) in Input menu & rate is placed under enter key in advance "F1" menu option.

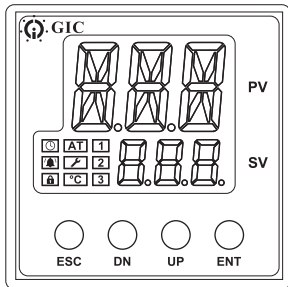
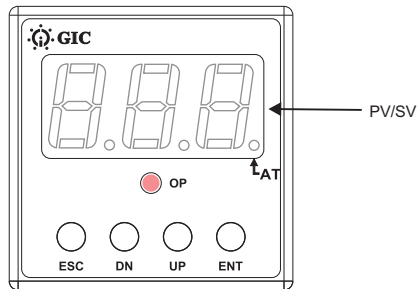
MOUNTING DIMENSION (mm)



RECOMMENDED PANEL CUTOUT
45 mmX 45 mm +0.5 mm



FRONT FACIA



Sr.no	Display/Indications	Description
1	PV	To display the Process Value
2	SV	To display the Set Value
3	OP/1	To indicate the LED for Output 1
4	°C	To indicate the LED for unit of °C (Applicable for TCS2T100)
5	AT	To indicate the LED for Auto tuning process
6		To indicate the LED for product is into setting mode (Applicable for TCS2T100)
7		To indicate the LED for product is into Lock mode (Password enable) (Applicable for TCS2T100)
8	1 2 3	Not applicable

Front Keys Description

1	ESC (Escape key)	To exit from main menu. To return to home screen. To abort changed value or parameter. Press 2 sec to display SP menu.
2	DN (Down key)	Press once to display the effective set Value To decrement the value
3	UP (Up key)	Press once to display the set Value To increment the value
4	ENT (Enter key)	Press 2 sec to enter into the main menu To save & move to next parameter

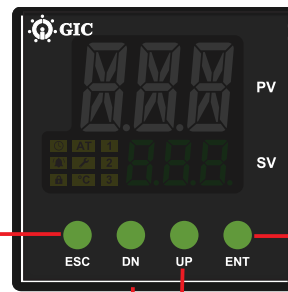
PROGRAMMING CODE

Code: This menu is used to make product setting trouble-free. The code menu is placed under Enter key (main menu) Press enter key for 2 sec-->using DN key--> goto [] menu Now according to your application generate the necessary code using below table for reference and set in the product. This parameters is used to set the combinations of output function (FUN), controller output (OP), control action (CN), Unit (UNT) & Sensor type (SEN)

Output function	Controller output	Digit 1	Control action	Unit	Digit 2	Sensor type	Digit 3
Heat	Relay	0	PID	°C	0	J	0
Heat	SSR	1	PID	°F	1	K	1
Cool	Relay	2	OFS	°C	2	T	2
Cool	SSR	3	OFS	°F	3	R	3
			OFA	°C	4	S	4
			OFA	°F	5	PT-100	5

For eg: If user want to set PT-100 sensor, Heat function, SSR output PID action and unit in °C. Then for above setting the code will be => 105 user just have to set 105 in the [] menu & above parameters will directly set into the devices.

CONFIGURATION MENU



Press ESC key for 2 Sec

Press DN key for 2 Sec
Input menu (INP)

Display value	Parameter Description	Default value	Range
SP1	Set Point 1	---	SPL to SPH
SP2	Set Point 2	---	SPL to SPH
SP3	Set Point 3	---	SPL to SPH
ESP	Effective Set Point	SP1	SP1,SP2,SP3

Note : SP1, SP2 & SP3 range will be updated as per Select sensor SPL & SPH.

Display value	Parameter Description	Default value	Range
SEN	Sensor	J	J/K/T/R/S/PT1
OP	Controller Output	RLY	RLY/SSR
CN	Control action	PID	PID/OFS/OFA
FUN	Function	HET	HET/COL
OFF	Offset	0	-100 to 100

Press UP key for 2 Sec
Regulator menu (REG)

Display value	Parameter Description	Default value	Range
TUN	Auto tune	OFF	OFF/TMN/T1P/TSP/TEP
RLG	Controlling Algorithm	RG1	AG1/AG2/AG3
PB	Proportional Band	54	1 to 999
INT	Integral time	23.0	0.0 to 99.9
PB	Proportional Band	54	1 to 999
INT	Integral time	23.0	0.0 to 99.9
DER	Derivative time	345	1 to 999
CYT	Cycle time	15	1 to 130
UNT	Unit	C	°C/°F
SPL	Set point low limit	-199	Low value of Selected sensor to High value of Selected sensor
SPH	Set point high limit	150	Low value of Selected sensor to High value of Selected sensor
DUR	Display update rate	1	1 to 100

Press ENT key 2 Sec
Main menu

Display value	Parameter Description	Default value	Range
INP	Input menu	Refer INP menu flow	
REG	Regulator menu	Refer REG menu flow	
PWD	Password	DIS	DIS/EN
RST	Factory reset	NO	NO/YES <small>(If yes, DNE will display & product will be factory reset)</small>
CODE	Code	000	000 to 355
ADV	Advance menu	NO	NO/YES

If ADV is yes below menu will be visible:

Display value	Parameter Description	Default value	Range
EDC	Cold junction cmp	EN	EN/DIS
RTE	Rate	1.00	0.01 to 2.00
PE	O/P Power error	0.00	00.0 to 100(%)
IUR	Input update rate	1	1 to 100